

Class	Register Number	Name
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南洋女子中學校
NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2019
Secondary Three IP

IP BIOLOGY

Paper 1 Multiple Choice

Friday

Additional materials: OAS

11 October 2019

45 minutes
0845 – 0930

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Write your name, register number and class at the top of this page and on the OAS in the spaces provided.

There are **thirty** questions in this paper. Answer **all** questions. For each question there are four possible answers, **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **pencil** on the separate OAS provided.

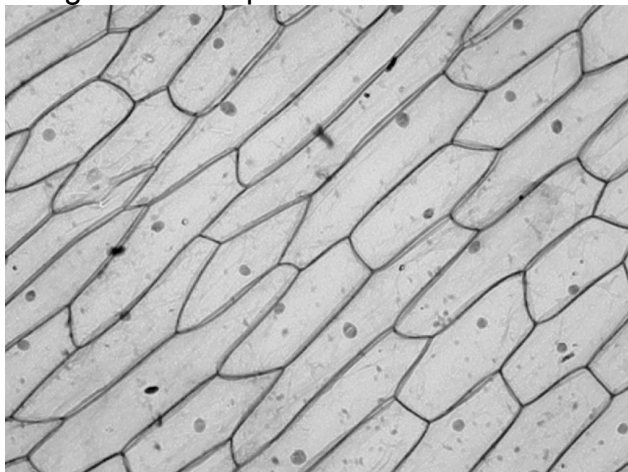
Read the instructions on the OAS very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

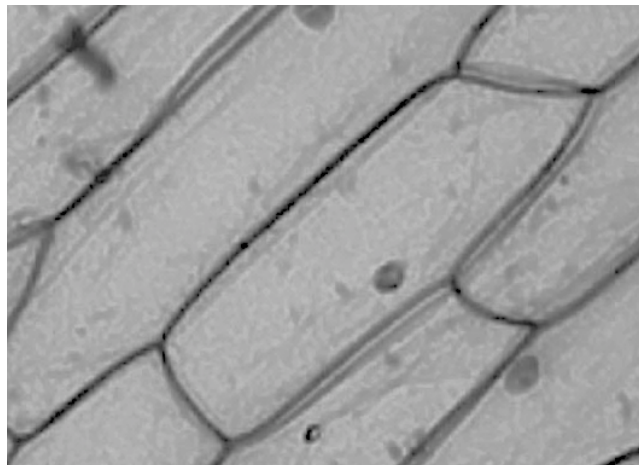
Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate.

- 1 The micrographs show the view of plant cells before and after adjustments are made using a microscope.



before adjustment



after adjustment

[adapted from <https://www.amazon.com/Cellular-Organelle-Nucleus-Plant-Cell/dp/B019NSPR4I>]

Which row shows the actions taken to obtain the image on the right (after adjustment)?

	objective lens changed from	image focused with
A	10X to 40X	coarse adjustment knob
B	40X to 10X	coarse adjustment knob
C	10X to 40X	fine adjustment knob
D	40X to 10X	fine adjustment knob

- 2 *Vibrio cholerae* is an organism that can cause the disease cholera. The symptoms of this disease are diarrhoea and vomiting within several hours to 3 days after ingestion.

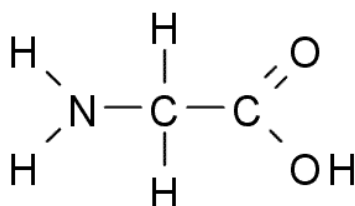
The characteristics of *Vibrio cholerae* are listed below:

- 1 It makes ATP by aerobic respiration.
- 2 It is a comma-shaped bacterium.
- 3 It has a flagellum.
- 4 It is capable of fermentation when there is no oxygen present.
- 5 It has a circular chromosome suspended in cytoplasm.

Is *Vibrio cholerae* a prokaryote or eukaryote, and which statements support your deduction?

	type of cell	statements supporting deduction
A	eukaryote	1 and 3
B	eukaryote	2 and 4
C	prokaryote	2 and 5
D	prokaryote	3 and 4

- 3 The chemical structure of a nutrient is shown below.



What happens to this molecule when it is found in excess in our bodies?

- A** It is broken down by protease into urea and glucose.
B It is converted to proteins and stored in the muscles.
C It is deaminated and then removed by the kidneys.
D It is metabolised for energy.
- 4 A student carried out a series of food tests to identify the compounds in each of the three test tubes.

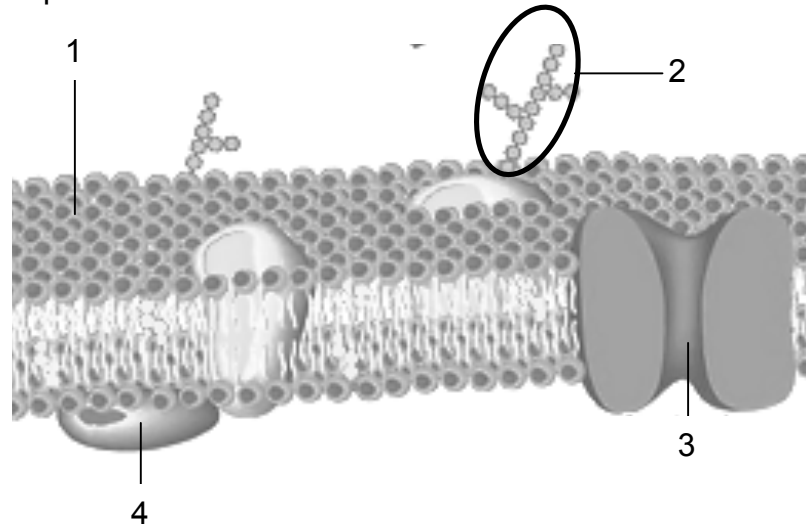
The table shows the results of the student's tests.

tube	Benedict's test	biuret test	iodine in potassium iodide	alcohol-emulsion test
X	brick red	violet	brown	white emulsion
Y	green	blue	blue-black	clear
Z	blue	violet	blue-black	clear

Which statement is consistent with the results?

- A** Tube X contains sucrose and peanuts.
B Tube Y contains glucose and starch.
C Tube Y contains peanuts and starch.
D Tube Z contains egg white and glucose.

- 5 The diagram shows part of the cell membrane.



[Adapted from <https://study.com/academy/lesson/lipid-bilayer-definition-structure-function.html>]

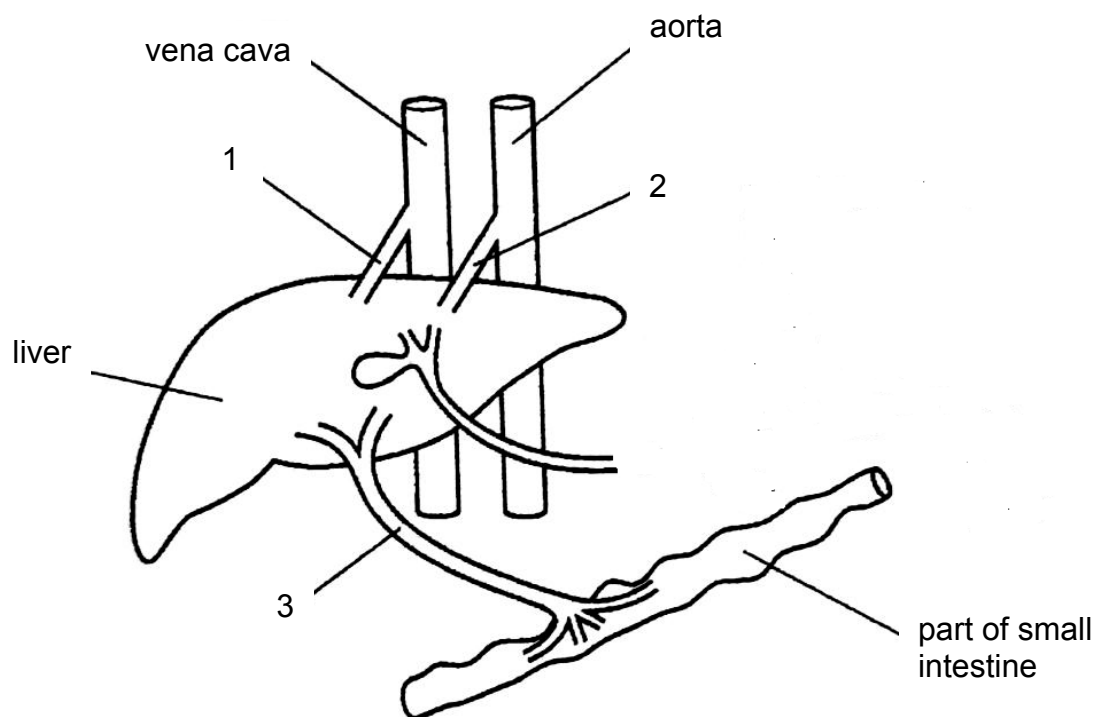
Which structures when mixed with protease would produce amino acids only?

- A 1 and 2 only
 - B 3 and 4 only
 - C 1, 3 and 4 only
 - D 1, 2 and 4 only
- 6 DNA was extracted from a fruit fly and the cheek cells of a human.

In which way did the DNA differ?

- A ratio of cytosine to guanine
- B sequence of nucleotides
- C type of nucleotides
- D type of pentose sugars

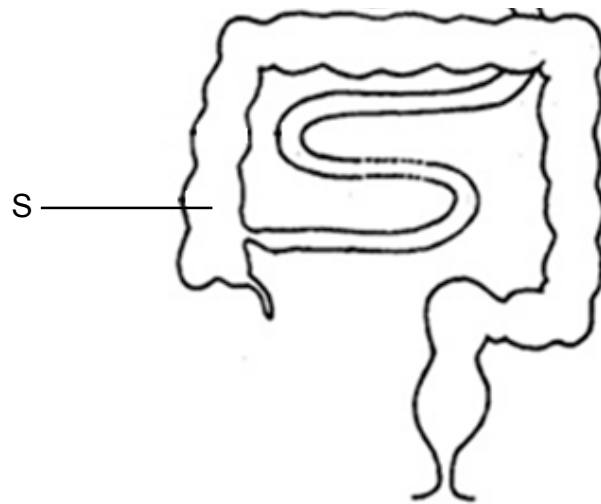
7 The diagram below shows the liver and its associated blood vessels.



What are blood vessels 1, 2 and 3?

	hepatic artery	hepatic vein	hepatic portal vein
A	1	2	3
B	1	3	2
C	2	1	3
D	3	1	2

- 8 The diagram shows a part of the human alimentary canal.

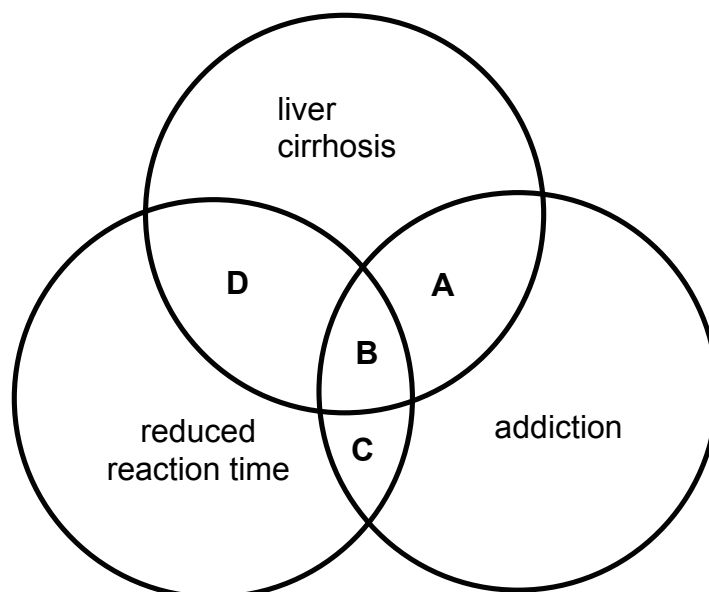


What are the possible consequences of shortening organ S in an individual?

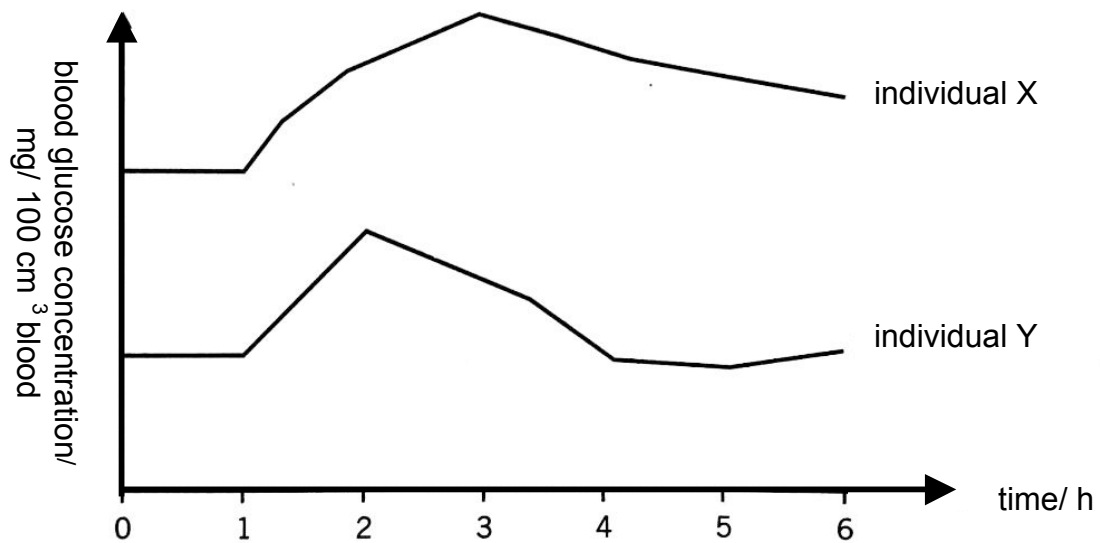
- 1 Absorption of mineral salts is reduced.
- 2 Absorption of water is reduced.
- 3 Digestion of cellulose is reduced.
- 4 Peristalsis slows down.

- A** 1 and 2 only
B 1 and 3 only
C 2 and 4 only
D 1, 3 and 4 only

- 9 Which section of the diagram represents the effects of excessive alcohol consumption?



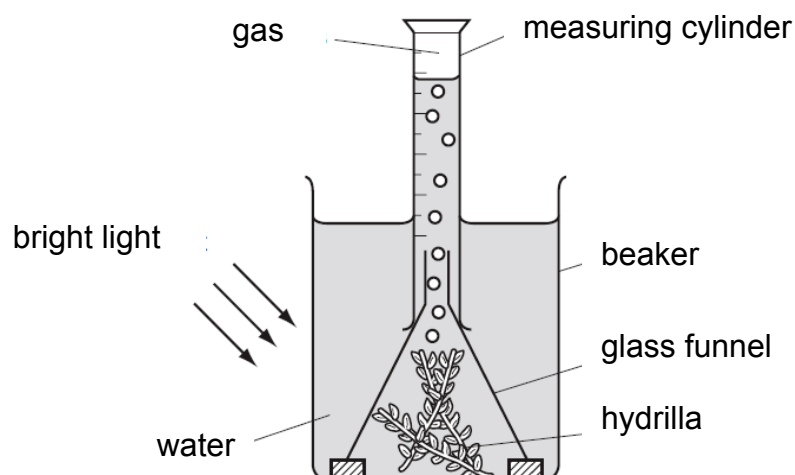
- 10** The graphs below show the changes in the blood glucose concentration of two individuals X and Y after a carbohydrate-rich meal taken at $t = 0$ h. One of the individuals has diabetes mellitus.



Which of the following cannot be deduced from the graph?

- A** Individual X has a higher respiration rate than individual Y.
- B** Individual X produces less insulin than individual Y.
- C** Individual X is likely to be the person who has diabetes mellitus.
- D** It takes time for digestion and absorption of carbohydrates to be completed.

- 11** The diagram shows the apparatus used in an investigation to measure the rate of photosynthesis.



The results of the experiment are shown in the table below.

mass of sodium bicarbonate added/ g	volume of gas collected in one minute/ $\text{cm}^3 \text{ min}^{-1}$
0.5	2.0
1.0	2.4
1.5	3.2
2.0	4.2
2.5	4.8
3.0	5.0

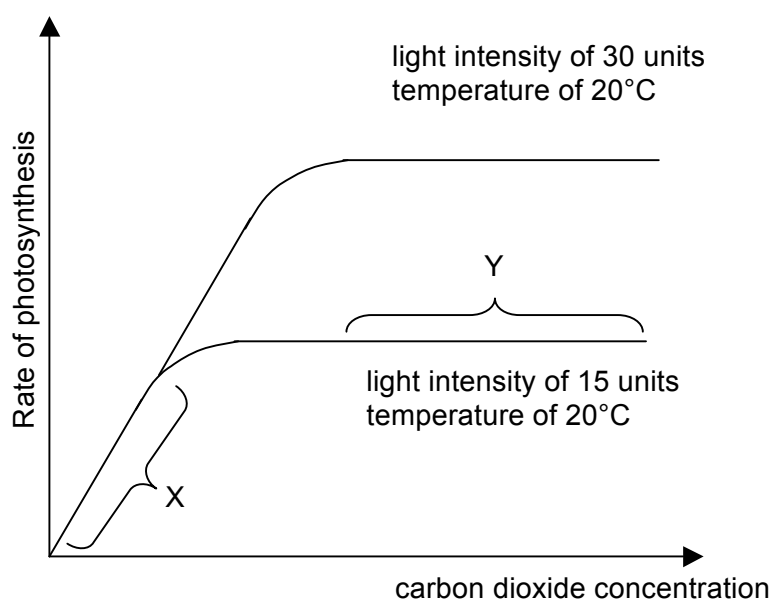
What can be concluded from the experiment?

- 1 Light intensity is a limiting factor.
- 2 Temperature affects the volume of gas collected.
- 3 The variable investigated was carbon dioxide concentration.
- 4 To increase rate of photosynthesis, mass of sodium bicarbonate added can be further increased.

- A** 1 and 4 only
B 2 and 3 only
C 3 and 4 only
D all of the above

- 12** A student carried out experiments to determine how different variables affect rate of photosynthesis.

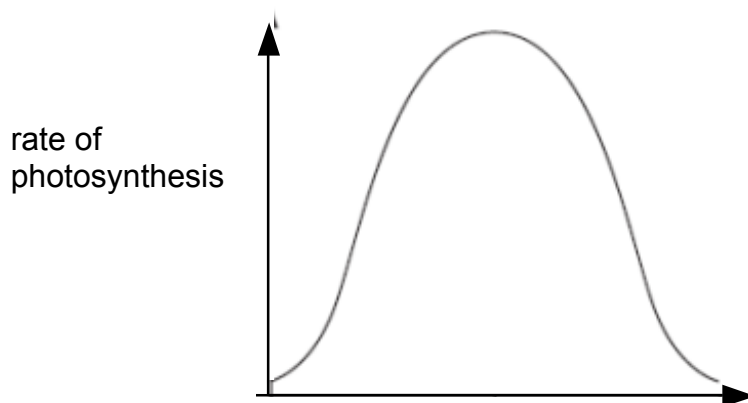
Her results are represented in the graphs.



What are the limiting factors at X and Y?

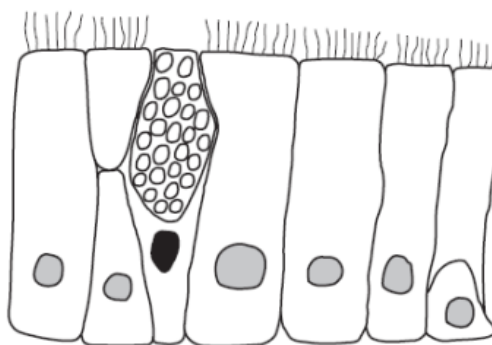
	X	Y
A	carbon dioxide concentration	carbon dioxide concentration
B	carbon dioxide concentration	light intensity
C	light intensity	carbon dioxide concentration
D	light intensity	temperature

- 13** The graph below shows the rate of photosynthesis plotted against an unknown factor.



What was the factor that was investigated in the experiment?

- A** carbon dioxide concentration
 - B** light intensity
 - C** pH
 - D** temperature
- 14** The diagram below shows some cells obtained from a part of the respiratory system.



Where can these cells be taken from?

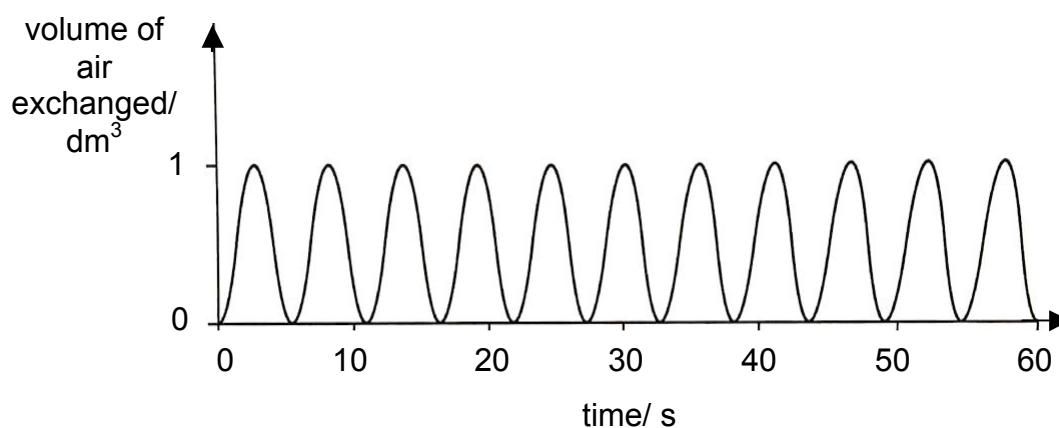
	trachea	bronchus	bronchiole	alveolus
A	✓	✓	✓	✗
B	✓	✗	✓	✓
C	✓	✓	✗	✗
D	✗	✗	✓	✓

- 15** The table shows actions involved in breathing.

Which row describes what happens during inhalation?

	external intercostal muscles	diaphragm
A	contract	contract
B	contract	relax
C	relax	contract
D	relax	relax

- 16** The breathing pattern of a student when she was at rest is shown below.



percentage of oxygen in inspired air/ %	percentage of oxygen in expired air/ %
21	17

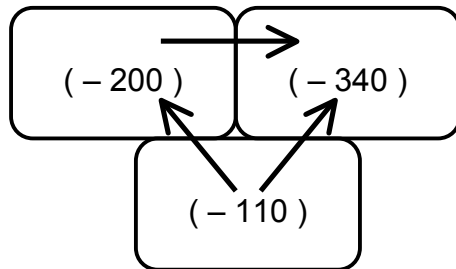
What is the volume of oxygen that is absorbed into her blood in 1 minute?

- A** 0.04 dm³
- B** 0.44 dm³
- C** 1.00 dm³
- D** 1.87 dm³

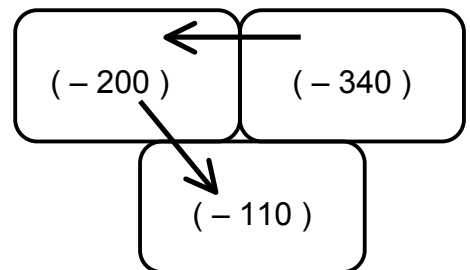
- 17** Three adjacent plant cells are shown in each of the diagrams below. The water potential values of the cells are indicated in the brackets, in kPa.

Which diagram correctly shows the direction of water movement from cell to cell?

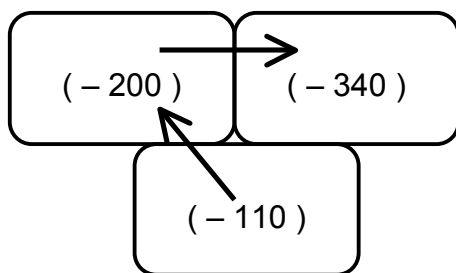
A



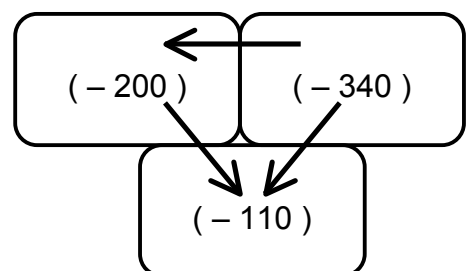
B



C



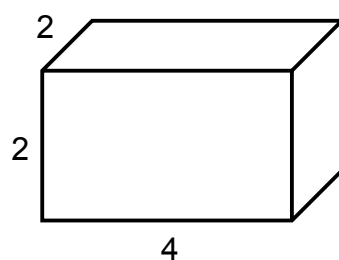
D



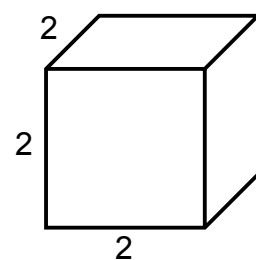
- 18** Four pieces of agar were cut into different shapes. The measurements shown are in cm.

When placed in a dye, which piece would take the shortest time to be completely stained with the dye?

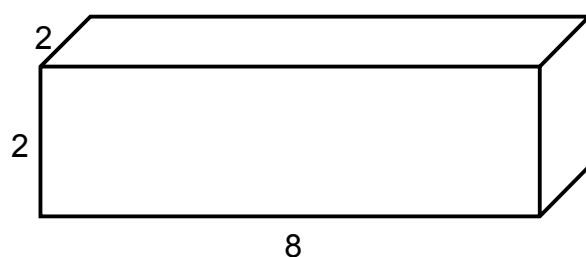
A



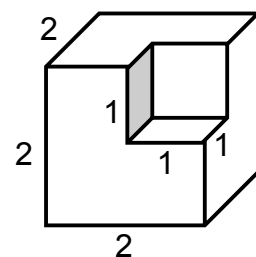
B



C

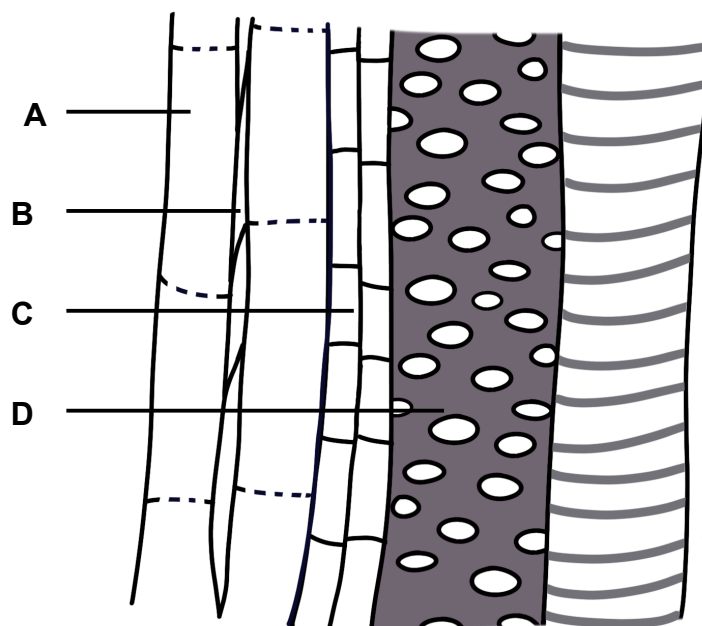


D



- 19** The diagram shows the longitudinal section of some cells in a dicot stem.

At which part would an aphid insert its mouthpart to feed?

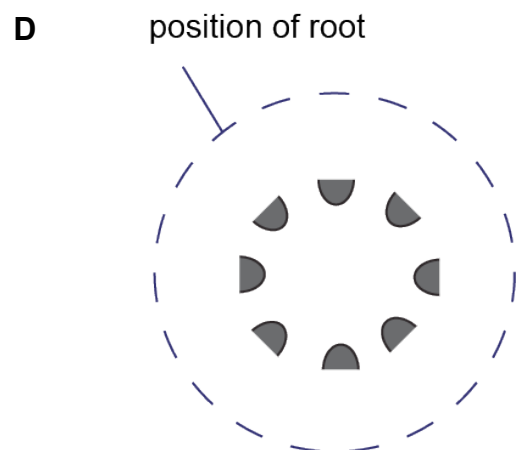
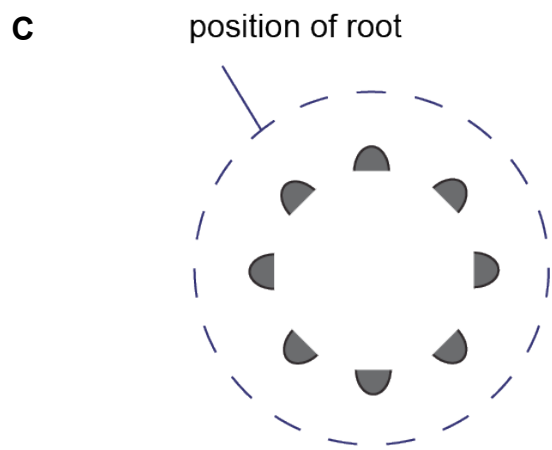
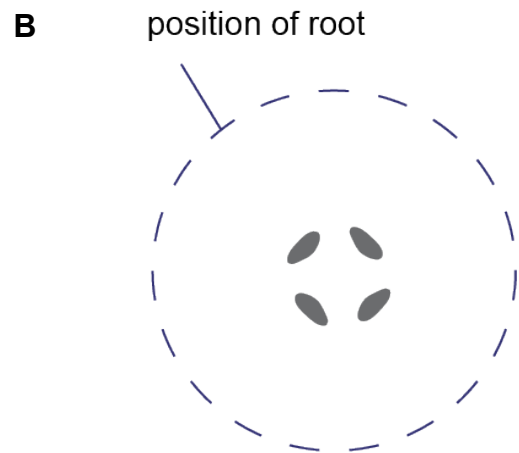
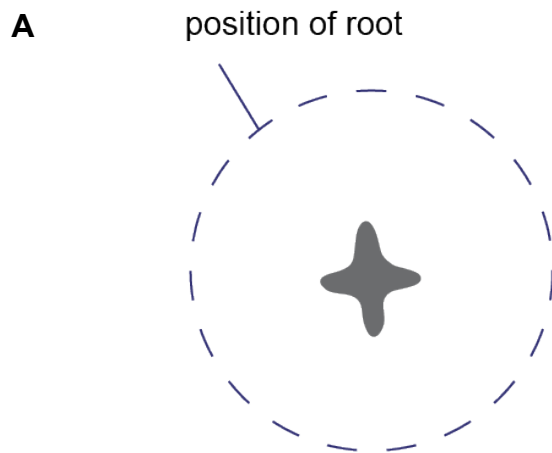


- 20** When young leaves are being formed on a plant, large amounts of mineral ions are needed. Where and when is the movement of mineral ions in the plant the greatest?

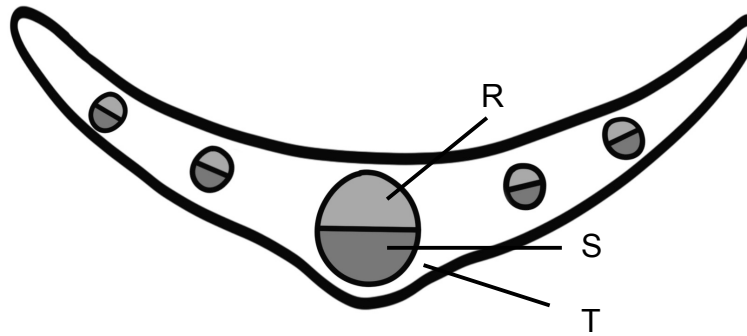
	where	when
A	cambium	cool, windy morning
B	companion cell	cool, cloudy day
C	sieve tube cell	warm night
D	xylem	warm, sunny day

- 21** The leaves of a plant were exposed to radioactive carbon dioxide. After the plant was left for several hours in the sun, a cross-sectional slice of the root was made. The slice of root was exposed to X-ray film.

Which diagram correctly shows the X-ray film exposed to the slice of root?



22 The diagram shows a leaf in cross-section.

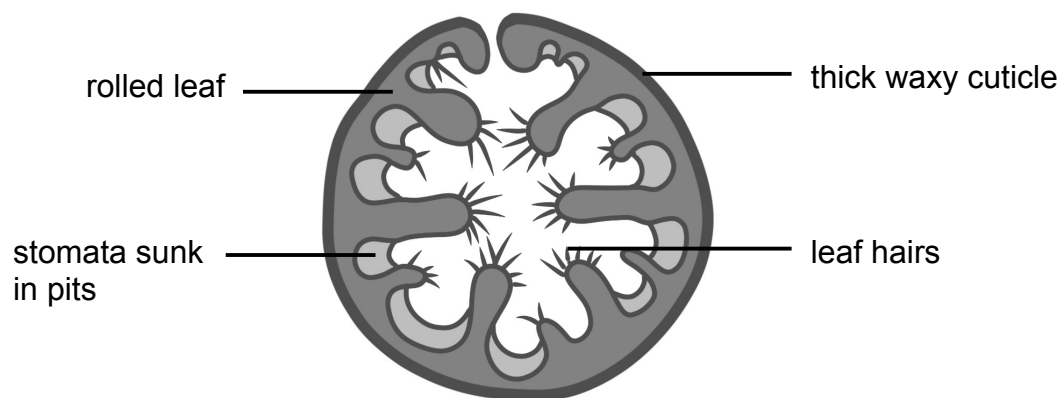


How are structures R, S and T related?

- 1 R transports glucose made by T during photosynthesis
- 2 R transports water for T to conduct photosynthesis
- 3 S transports glucose made by T during photosynthesis
- 4 S transports water for T to conduct photosynthesis

- A** 1 only
B 2 only
C 1 and 3
D 2 and 4

23 The diagram shows the cross-section of marram grass.



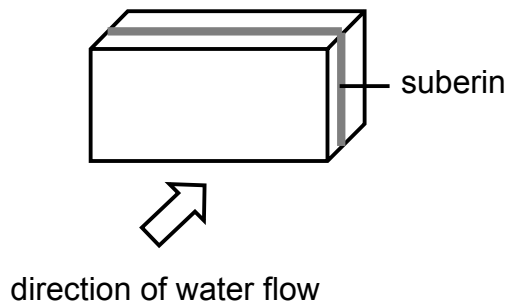
What habitat is this grass likely to be found in?

- A** mangrove mudflats
B rainforest
C sandy coastal area
D submerged in a pond

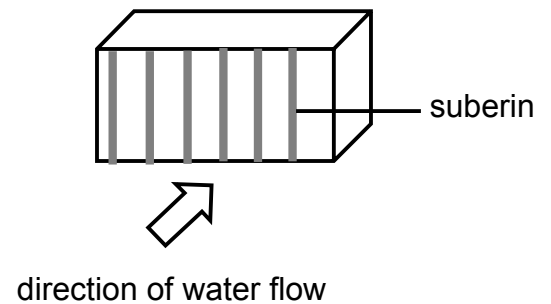
- 24** The endodermis is found in the root. The endodermal cells contain a strip of waterproof material, suberin, in their cell wall. This forces water molecules to enter the cell and move via the symplast pathway.

Which correctly shows the distribution pattern of suberin material in an endodermal cell?

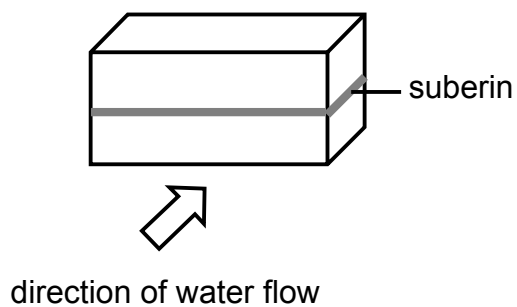
A



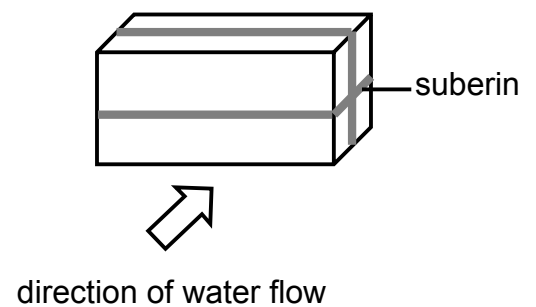
B



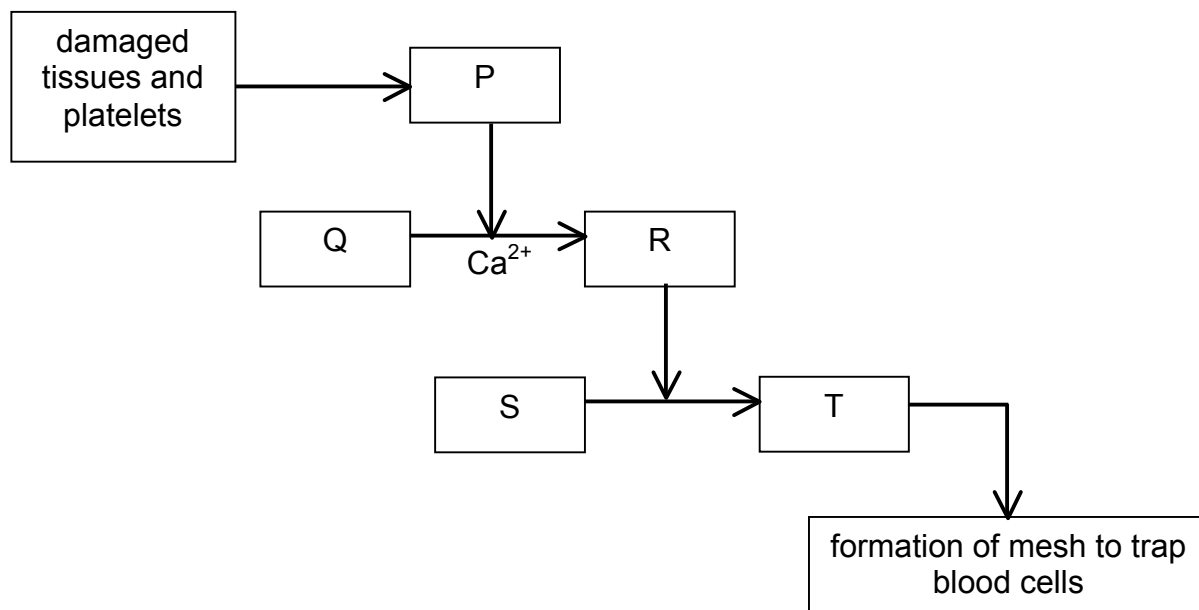
C



D



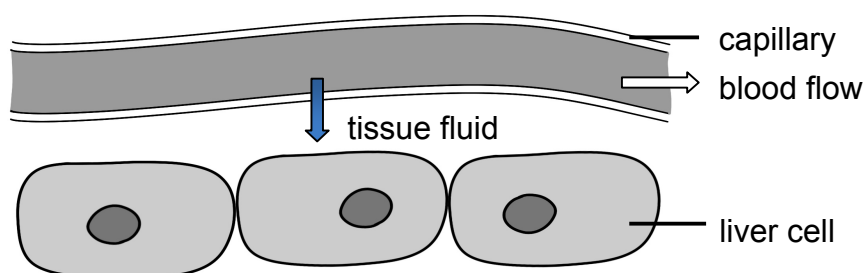
25 The flowchart shows the blood-clotting cascade.



What are P, Q and T?

	P	Q	T
A	pre-prothrombin	thrombin	fibrinogen
B	prothrombin	thrombokinase	fibrin
C	thrombin	thrombinogen	fibrinogen
D	thrombokinase	prothrombin	fibrin

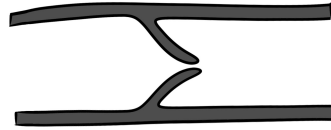
26 The diagram shows some liver cells next to a capillary.



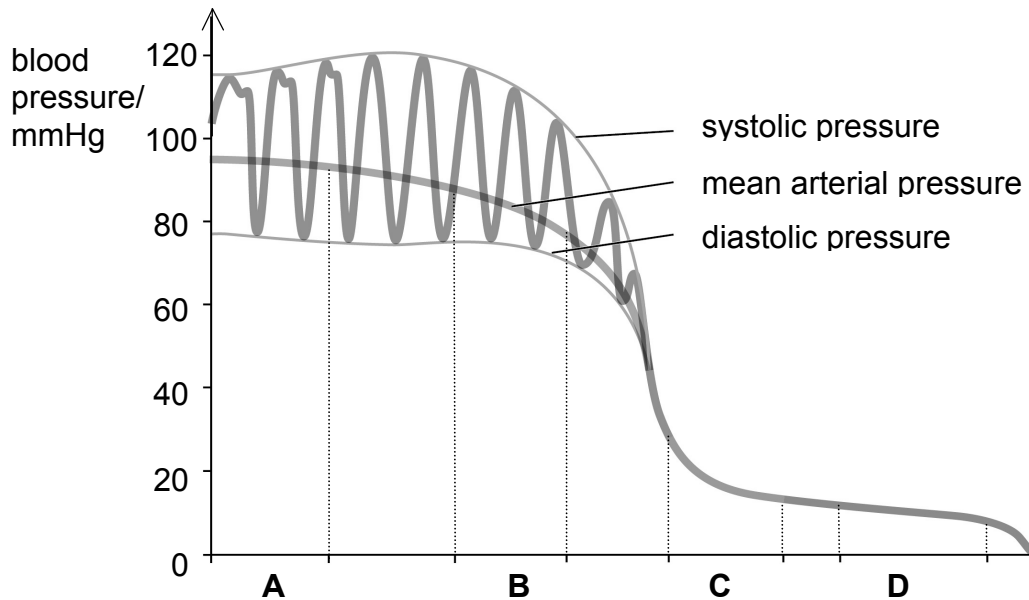
What is present in the tissue fluid formed from the plasma?

- A** bile and haemoglobin
- B** fibrinogen and water
- C** glucose and insulin
- D** oxygen and platelets

- 27** The diagram shows a blood vessel in longitudinal section.

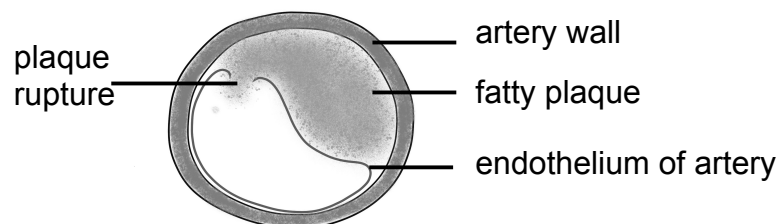


Which part of the blood pressure graph corresponds to the blood vessel?



[source: <https://opentextbc.ca/anatomyandphysiology/>]

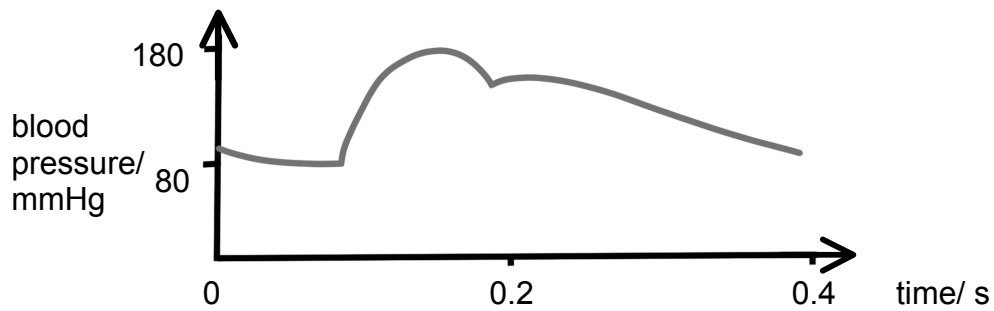
- 28** The diagram shows a cross-section of a blood vessel located in the brain of a patient.



What might happen to the patient?

- 1 a blood clot forms in the blood vessel
 - 2 the patient suffers from a heart attack
 - 3 the patient suffers from a stroke
 - 4 there is reduced blood flow through the blood vessel
- A** 1 and 2
B 2 and 4
C 1, 2 and 4
D 1, 3 and 4

- 29** A person took part in an activity. The graph shows the changes in aortic blood pressure in a single heartbeat, during the activity. Assume that the heart was beating at an even pace during the activity.



What could be the person's activity?

- 1 climbing stairs
 - 2 eating
 - 3 running away from a lion
 - 4 sleeping
- A** 1 and 2
- B** 1 and 3
- C** 2 and 4
- D** 3 and 4

- 30** In 1890, German bacteriologist Robert Koch developed tuberculin, which could be used as a diagnostic test for tuberculosis. To make this product, he heated the tuberculosis bacteria and filtered the mixture to remove the infectious organism. The remaining broth was tuberculin. When tuberculin was injected into a person with tuberculosis disease, a visible local reaction could be seen on the skin. This reaction could be used as an indicator for the disease.

How did this diagnostic test work?

- 1 the patient's antibodies bind to the protein in tuberculin
 - 2 the patient's antigens bind to the protein in tuberculin
 - 3 the patient infected with tuberculosis produces antibodies
 - 4 the patient infected with tuberculosis produces antigens
 - 5 tuberculin broth contained protein found in tuberculosis bacteria
- A** 5 only
- B** 2 and 5
- C** 1, 3 and 5
- D** 2, 4 and 5

End of Paper